Chapter 9

# THE FRAMEWORK: STUDENTS WITH DIVERSE NEEDS

Part A: Science Instructional Adaptations for Students with Disabilities

Part B: Science Instructional Adaptations for Students with Limited English Proficiency

Part C: Science Instructional Adaptations for Exceptionally Able Students

# PART A: SCIENCE INSTRUCTIONAL ADAPTATIONS FOR STUDENTS WITH DISABILITIES

## INTRODUCTION

The *New Jersey Core Curriculum Content Standards* and related curriculum frameworks are the focus of curriculum and instruction for all pupils. This population includes students with disabilities. In order to provide pupils with disabilities meaningful access to curriculum and instruction based on the content standards, adaptations may be required. Adaptations are not intended to compromise the content standards. Instead, adaptations provide students with disabilities the opportunity to maximize their strengths and compensate for their learning differences.

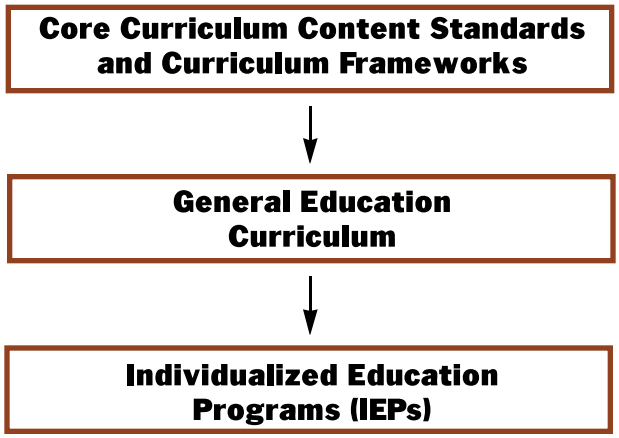


*Figure 1*

Consistent with the expectation that students with disabilities participate in the general education curriculum, is the requirement that the Individualized Education Programs (IEPSs) of students with disabilities, reflect the core content standards and the local school district's general education curriculum (see Figure 1).

# ADAPTATION: A FEDERAL REQUIREMENT

**The Individuals with Disabilities Act Amendments** of 1997 and Section 504 of the Rehabilitation Act of 1973 guarantee students with disabilities the right to general education program adaptations, as specified in their Individualized Education Programs (IEPs) or 504 plans. These federal requirements are intended to result in adaptations that provide these pupils access to the general education program and general education curriculum.

Students with disabilities demonstrate a broad range of learning, cognitive, communication, physical, sensory, and social/emotional differences that may necessitate adaptations to the general education program. Each pupil manifests his learning abilities, learning style, and learning preferences in a unique way. Consequently, the type of adaptations needed and the program in which the adaptations will be implemented, are determined individually within the Individualized Education Program (IEP) or 504 planning processes (see Figure 2).

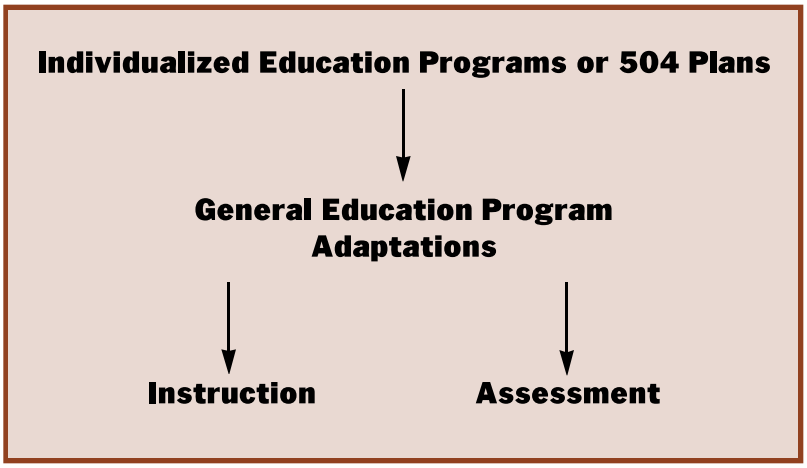


*Figure 2*

Within the content of the Science Framework Learning Demonstration Activities, adaptation is defined as:

***Any adjustment or modification to the general education program enabling students with disabilities to***

- participate in and benefit from learning activities and experiences based on the *Core Curriculum Content Standards*
- demonstrate understanding and application of the content standards

# CATEGORIES OF ADAPTATIONS TO THE LEARNING ACTIVITIES IN THE NEW JERSEY SCIENCE CURRICULUM FRAMEWORK

The Science Framework contains a variety of activities that emphasize hands-on learning experiences. These experiences can provide a valuable bridge between the general language of the standards and the greater specificity of the district's science curriculum. Consequently, adaptations to the hands-on experiences were identified to complement and make accessible this type of instruction.

**Note:** Additional adaptations may be needed to complement lecture and textbook teaching formats.

The categories listed below are intended to guide the process of selecting adaptations to the *Science Framework's* learning activities for an individual pupil with disabilities. Adaptations include, but are not limited to, the following:

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## Instructional Presentation

*Instructional Preparation*
*Instructional Prompts*
*Instructional Application*
*Instructional Monitoring*

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## Classroom Organization

*Instructional Groups*
*Instructional Support*
*Environmental Conditions*
*Adaptive Equipment*

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## Student Response

*Response Format*
*Response Procedures*

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## Safety Considerations

*Safety Rules and Procedures*
*Safe Use of Equipment*

# DESCRIPTIONS OF ADAPTATIONS TO THE LEARNING ACTIVITIES IN THE NEW JERSEY SCIENCE CURRICULUM FRAMEWORK

Descriptions—including the rationale, specific functions, and example for each category of adaptation—are provided below. Following these descriptions are sample adaptations to selected learning activities of the *Science Framework*.

***Note:*** The adaptations listed below are based on effective instructional practices for all students. While these strategies can be beneficial to all students, they may be an essential component of the instructional program for a student with disabilities.

## INSTRUCTIONAL PRESENTATION

***Rationale:*** Students with disabilities may require instructional presentations that will enable them to acquire, comprehend, recall, and apply science content and related processes. In addition, instructional presentation adaptations can enhance a student's attention and ability to focus on instruction.

***Purpose:*** The primary purpose of these adaptations is to provide special education students with teacher-initiated and teacher-directed interventions that prepare students for learning and engage students in the learning process *(Instructional Preparation)*; structure and organize information *(Instructional Prompts)*; foster understanding of new concepts and processes *(Instructional Application)*; and promote student self-reflection and self-management regarding tasks demands, goal attainment, and performance accuracy *(Instructional Monitoring)* during the *Science Framework's* learning activities.

### Instructional Preparation

***Purpose:***

- Motivate
- Establish purpose and goals of lesson
- Activate prior knowledge
- Build background
- Focus
- Organize

***Examples:***

- Previewing information/materials
- Advance organizers
- Brainstorming and webbing
- Questioning techniques
- K-W-L strategies
- Warm-ups
- Visual demonstrations, illustrations, and models

## Instructional Prompts

***Purpose:***

- Organize information
- Build whole-part relationships
- Cue associations and connections
- Highlight essential concepts
- Generate categorization and comparisons
- Activate recall
- Summarize

***Examples:***

- Graphic organizers
- Semantic organizers
- Outlines
- Mnemonics
- Analogies
- Feature analysis
- Color coding
- Labels

## Instructional Application

***Purpose:***

- Simplify abstract concepts
- Provide concrete examples
- Extend ideas and elaborate understanding
- Build connections and associations
- Relate to everyday experiences
- Promote generalization

***Examples:***

- Graphics
- Data charts
- Flow charts
- Drawings and other illustrations
- Dramatics - role play
- Field trips
- Games
- Puzzles
- Models
- Simulations
- Concept activities
- Application activities

## Instructional Monitoring

***Purpose:***

- Provide periodic (continuous) check for understanding
- Redirect attention
- Direct on-task behavior
- Promote participation
- Check progress
- Assist in goal setting
- Establish timelines
- Clarify assignments, directions, and instructions
- Provide reinforcement and corrective feedback
- Promote strategy use and generalization
- Manage student behavior and interactions
- Develop self-questioning and self-regulation

***Examples:***

- Segmenting techniques - task analysis
- Self-monitoring checklists
- Think-alouds
- Journal entries
- Portfolios
- Interviews
- Questioning techniques
- Student contracts
- Reward system

# CLASSROOM ORGANIZATION

***Rationale:*** Students with disabilities may require specific adaptations to classroom organization in order for them to be actively involved in the *Science Framework's* learning activities.

***Purpose:*** The primary purpose of these classroom organization adaptations is to maximize student attention, participation, independence, mobility and comfort; to promote peer and adult communication and interaction; and to provide accessibility to information, materials, and equipment.

### Instructional Groups

***Examples:***

- Cooperative learning groups
- Peer partners - buddy system
- Teams

### Instructional Support *(from another individual)*

***Examples:***

- Assist physically
- Clarify
- Prompt - cue
- Gesture - signal
- Interpret
- Reinforce
- Highlight
- Organize
- Focus

### Environmental Conditions

***Examples:***

- Physical room arrangement
- Workspace
- Material accessibility
- Lighting
- Noise level
- Learning stations/lab stations
- Labeling equipment, stations, seat assignments
- Seating arrangements -seat assignment
- Portable units

### Adaptive Equipment

***Examples:***

- Speech synthesizer
- Communication board
- Close-captioned video-TV/decoder
- Audiotaped material
- Braille
- Enlarged print
- Low-vision equipment (e.g., clock)
- Talking watch or calculator
- FM System
- Lap board

## STUDENT RESPONSE

***Rationale:*** Students with disabilities may require specific adaptations in order to demonstrate acquisition, recall, understanding, and application of science content and related processes.

***Purpose:*** The primary purpose of student performance responses is to provide students with disabilities a means of demonstrating progress toward the lesson objectives related to the *Science Framework's* learning activities.

### Response Format

***Examples:***

- Complete information organizers
- Interviews and discussions
- Illustrations and diagrams
- Models
- Observation/data charts
- Puzzles
- Debates
- Journal and portfolio entries
- Bulletin board displays
- Role playing
- Video/audiotapes
- Computer printout

### Response Procedure

***Examples:***

- Extended time
- Practice exercises
- Interpreter
- Use of preferred response mode (e.g., written, dictated, or oral)

## SAFETY CONSIDERATIONS

***Rationale:*** The Science Framework's learning activities are hands-on experiences that occur in the classroom, laboratory, or outdoors. Students with disabilities may require adaptations in order to ensure safe participation for themselves and others.

***Purpose:*** The primary purpose of safety adaptations is to provide for understanding of and adherence to safety rules and procedures and safe use of materials, equipment, supplies, and chemicals.

### Safety Rules and Procedures

***Examples:***

- Understand safety and health rules and procedures
- Follow rules
- Material distribution
- Material and equipment use
- Preparation and clean up
- Sharing materials
- Time allocation

### Safe Use of Equipment

***Examples:***

- Role-playing
- Modeling - demonstrating
- Labeling
- Distribution of supplies and equipment
- Role and responsibility assignments
- Checklist - directions, procedures
- Timeline chart

# NEW JERSEY SCIENCE CURRICULUM FRAMEWORK SAMPLE ADAPTATIONS OF SELECTED LEARNING ACTIVITIES

## *"Is it Alive?"*

### Selected Learning Activity #1

**Core Curriculum Content Standard: 5.6**

***(referred to in this document as "Science Standard 6")***

**Indicator: 1**

**Page Number: 88**

**Grade Level: K-2**

### Category of Adaptation:

***Instructional Presentation – Instructional Prompt***

**Feature analysis** ***is a systematic procedure to help students understand and recall similarities and differences in related concepts through the categorization of information.***

1. Have students observe a "living" fish in water and several nonliving fish representations (e.g., a stuffed animal, a cutout figure of a fish, an animated cartoon, a computer graphic).

2. Conduct a teacher-led brainstorming activity, during which students generate characteristics of a "living fish" and a "nonliving" fish.

3. Based on the students' responses, identify major categories that distinguish living and nonliving fish.

4. Use these categories to develop a feature analysis chart that summarizes the major characteristics discussed with the students.

5. Have students complete the feature analysis chart, checking their own responses against a teacher-generated answer key (see illustration).

6. Question and clarify incorrect responses.

**Category of Adaptation:**

***Classroom Organization – Instructional Groups***

- Pairs of students conducting observations
- Whole-class brainstorming activity
- Individual completion of feature analysis chart

**Category of Adaptation:**

***Classroom Organization – Instructional Support***

- Teacher-led brainstorming activity
- Teacher-created feature analysis chart and answer key
- Follow-up questioning of incorrect responses on the feature analysis chart

**Category of Adaptation:**

***Classroom Organization – Environmental Conditions***

- Arrange stations for observations.

**Category of Adaptation:**

***Student Response – Response Format & Procedures***

- Participation in the brainstorming activity
- Completion of the feature analysis chart
- Explanation of any incorrect responses; student self-correction

# Living vs Non-Living Fish

| | Moves Itself | Responds to Touch | Can Be Fed | Living Fish | Non-Living Fish |
|---|---|---|---|---|---|
| *Graphic of Fish* | | | | | |
| *Fish in Water* | | | | | |
| *Stuffed Animal* | | | | | |

| | Moves Itself | Responds to Touch | Can Be Fed | Living Fish | Non-Living Fish |
|---|---|---|---|---|---|
| *Graphic of Fish* | – | – | – | – | + |
| *Fish in Water* | + | + | + | + | – |
| *Stuffed Animal* | – | – | – | – | + |

# *"Partner Convection Experiments"*

## Selected Learning Activity #2

**Core Curriculum Content Standard: 5.9**

***(referred to in this document as "Science Standard 9")***

**Indicator: 4**

**Page Number: 170**

**Grade Level: 3-4**

### Category of Adaptation:

***Instructional Presentation – Instructional Prompt***

**Color coding** ***helps students organize information and focus on key concepts and ideas.***

1. Keep students involved in the activity by using a teacher-created observation sheet.
2. Use a different food color for each procedure (e.g., *blue* for cold over cold; *orange*, hot over hot; *green*, warm over warm; *red*, hot over cold; and *purple*, cold over hot).
3. Color-code observations on observation sheet to correspond with color treatments.

### Category of Adaptation:

***Classroom Organization – Instructional Groups***

- Pairs rotate the roles of experimenter and observer.

### Category of Adaptation:

***Classroom Organization – Instructional Groups***

- Prepare color-coded observation sheet to help students sequence observations and organize and record responses

### Category of Adaptation:

***Safety Considerations – Safety Rules & Procedures***

- Discuss safety precautions regarding use of hot water and glass jars.

# Student Observation Sheet: Describe Movement

***blue: cold over cold***

***orange: hot over hot***

***green: warm over warm***

***red: hot over cold***

***purple: cold over hot***

# *"Classifying Characteristics"*

## Selected Learning Activity #3

**Core Curriculum Content Standard: 5.7**

***(referred to in this document as "Science Standard 7")***

**Indicator: 7**

**Page Number: 121**

**Grade Level: 5-6**

### Category of Adaptation:

### *Instructional Presentation – Instructional Preparation*

***A* demonstration *helps to orient students to new activities, routines, procedures, or strategies. Through the use of physical, visual, and/or verbal models, students are introduced to the purpose of the lesson, the steps involved in a particular activity or routine, and the major concepts to be learned.***

### Category of Adaptation:

### *Instructional Monitoring – Think-aloud*

***A* think-aloud *is an example of cognitive strategy instruction, combining verbal mediation and cognitive behavior modification. Through the use of verbal models, students are exposed to various aspects of problem solving, including understanding the purpose of a task, having a plan of action, assessing progress, dealing with task difficulties, and revising actions.***

1. Instead of a whole-class activity, introduce this lesson using a "demonstration class model" that consists of a small group of students.

2. Using an overhead projector, develop a "mind map" that can serve as a visual model. With student input, narrow the student characteristics down to a single student (see illustration).

3. Conduct a teacher and/or expert-student "think-aloud" focused on the processes of observing, identifying, and narrowing classification categories (see illustration).

4. Videotape the class-model activity for future reinforcement and discussion of the classification process.

5. Repeat the activity with increasingly larger groups. Have each student complete a mind map that illustrates his or her unique quality as well as any similarities to other students.

6. On chart paper, create a class story that illustrates and describes the identified classification categories.

### Category of Adaptation:

***Instructional Presentation – Instructional Monitoring***

- Videotape of the class model activity for reinforcement, review, discussion, and/or classification

### Category of Adaptation:

***Classroom Organization – Instructional Groups***

- A small group of participants for the class model activity
- A buddy system to complete the mind map during the class model activity

### Category of Adaptation:

***Classroom Organization – Instructional Support***

- Teacher think-aloud
- Teacher-created mind map

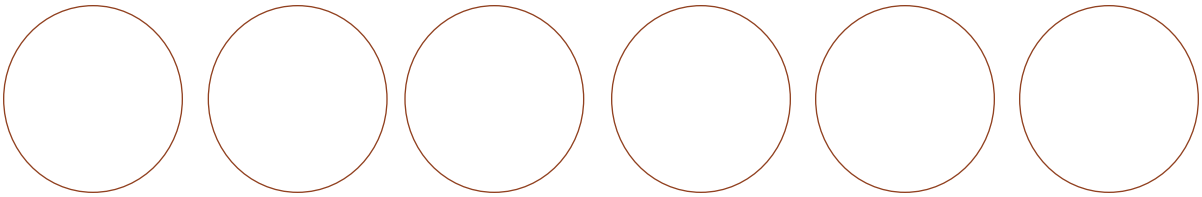
### Category of Adaptation:

***Student Response – Format & Procedures***

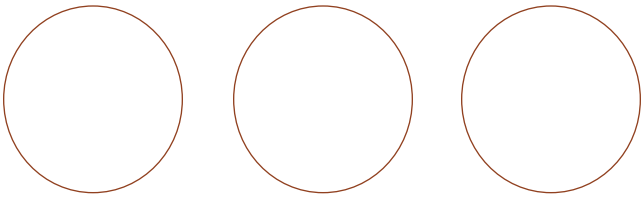
- Completion of mind map
- Participation in the development of class story

# Model Mind Map to Trace Back Student to Initial Characteristic

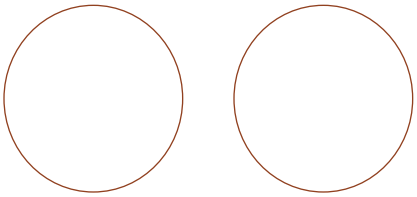
**Characteristic: Boys**



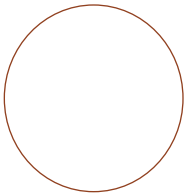
**Characteristic: Brown Hair**



**Characteristic: Brown Eyes**



**Characteristic: Left-Handed**



***Color in the chain that links one student to the single characteristic***

# Sample Teacher Think-Aloud
# SHOW & TELL

**"WHAT DO I HAVE TO DO?"**

*"Find a characteristic that these students have in common."*

*"Okay, let's see. Well, some of the students are boys!"*

**"THAT WAS EASY!" "NOW WHAT?"**

*"Find a characteristic that the boys have in common."*

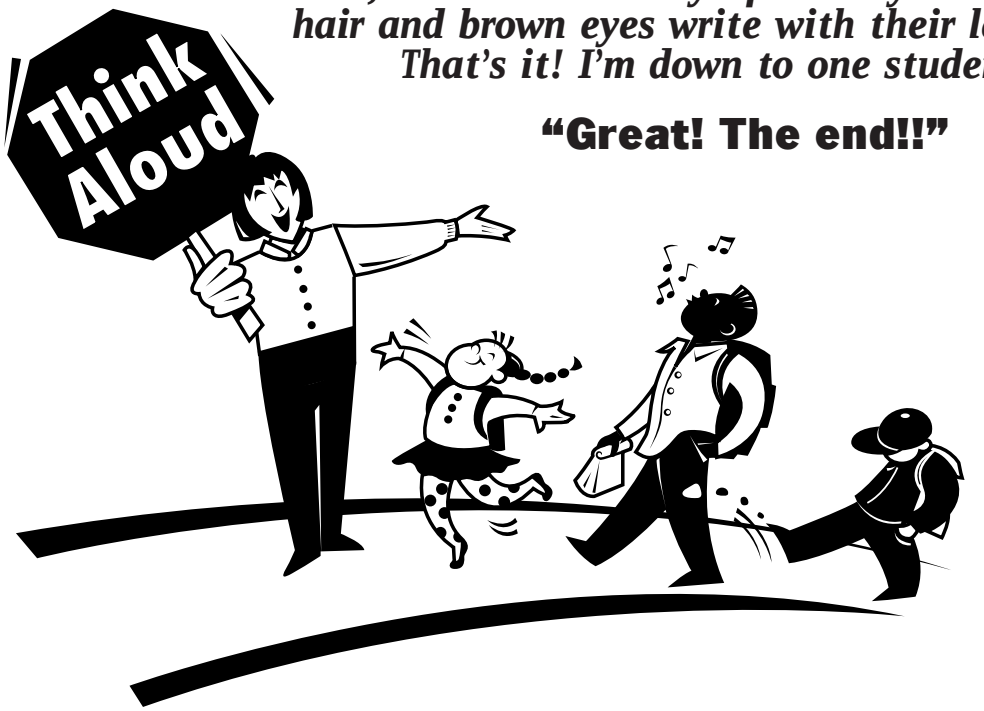
*"Hair color-that's a good one.*
*Three of the boys have brown hair."*

*"Now eye color.*
*Two of the boys with brown hair have brown eyes."*

**"GOOD! THE GROUP IS GETTING SMALLER!"**

*"Next, I'll ask how many of the boys with brown hair and brown eyes write with their left hand! That's it! I'm down to one student."*

**"Great! The end!!"**



# *"Bird Adaptations and Habitats"*

## Selected Learning Activity #4

**Core Curriculum Content Standard: 5.7**

***(referred to in this document as "Science Standard 7")***

**Indicator: 9**

**Page Number: 126**

**Grade Level: 5-6**

## Category of Adaptation:

### *Instructional Presentation – Instructional Application*

***A* concept activity *is a concrete presentation of abstract concepts. Using visual aids such as pictures or concrete materials, a concept activity helps to build connections and associations between new ideas and everyday experiences.***

1. Before beginning a discussion on bird adaptations, discuss human adaptations. This discussion provides students with a meaningful comparison based upon prior knowledge. For example, have students generate a list of foods. Ask the students to categorize the food according to the utensil used to eat that food type (e.g., a knife, fork, spoon, or hand).

2. With student input, list bird foods on the board, a piece of chart paper, or an overhead transparency, and categorize them according to the utensil used to eat that food type as above (e.g., a knife, fork, spoon, or hand).

3. Using illustrations of four bird beaks, students match the beak with a utensil:

   - Sharp beak = knife to rip
   - Pointed beak = fork to poke
   - Scooped bill = spoon to scoop
   - Large flat beak = hands to grasp and hold

4. Continue this concept activity by having students move in groups of four to different stations. Each member of the group represents a different type of beak and holds one of the items listed:

   - Staple remover = sharp beak (of a meat eater)
   - Toothpicks taped to fingernails = pointed beak (of a fruit eater)
   - Melon-ball scoop = scooped beak
   - Salad tongs = flat beak

5. Each station provides a variety of the foods suggested by the students. Challenge the students to identify which beak can be used to eat the different foods.

6. To complete this activity, have students in cooperative groups, match beak types with eating utensils. Then have students match beak types with bird foods using a teacher-created concept form.

**Category of Adaptation:**

***Classroom Organization – Instructional Groups***

- Cooperative learning groups for concept matching activities:
  - Sharp beak
  - Pointed beak
  - Scooped beak
  - Large flat beak

**Category of Adaptation:**

***Classroom Organization – Instructional Support***

- Teacher-generated concept activity form to organize categories and facilitate matches

**Category of Adaptation:**

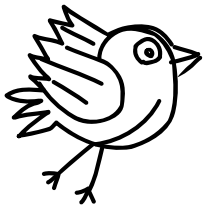
***Classroom Organization – Environmental Conditions***

- Organize cooperative learning group seating arrangement and food stations

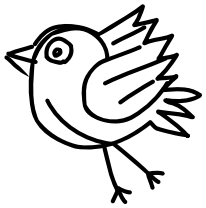
**Category of Adaptation:**

***Student Response – Response Format***

- Group responses provided on beak/food type concept activity form

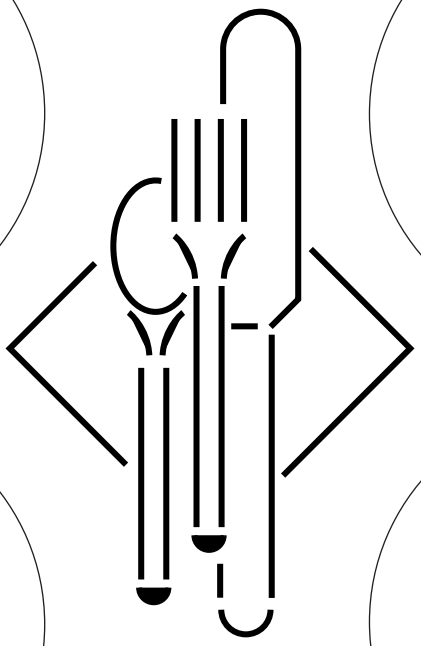


# Tweety's Tweets



**FORK**

**KNIFE**



**SPOON**

**HAND**

# *"Weather Journal"*

## Selected Learning Activity #5

**Core Curriculum Content Standard: 5.10**

***(referred to in this document as "Science Standard 10")***

**Indicator: 9**

**Page Number: 227**

**Grade Level: 5-6**

**Category of Adaptation:**

### *Instructional Presentation – Instructional Preparation (Warm-up)*

***An* application activity *encourages students to apply learned information in a practical way (e.g., conducting interviews, building a model, conducting observations, or developing illustrations).***

1. Prior to initiating daily weather observations, provide experience with weather forecasting. Direct a discussion about weather forecasts with questions such as the following: *Do you listen to weather forecasts? Why are forecasts useful? Are forecasts always correct?*

2. Using a variety of sources (e.g., newspaper, radio, television, Internet) organize weather stations and have students record weather forecasts.

3. Facilitate understanding of weather patterns and trends by having students keep a weather chart over an extended period of time (e.g., monthly patterns and comparisons; seasonal patterns and comparisons) (see illustration).

**Category of Adaptation:**

### *Classroom Organization – Instructional Groups*

- Weather forecast teams rotate among the four weather stations
- Organize weather stations
- Provide format for chart entries.

**Category of Adaptation:**

***Classroom Organization – Environmental Conditions***

- Four labeled weather stations:
  - Newspaper
  - Radio
  - Television
  - Internet access

**Category of Adaptation:**

***Student Response – Response Format***

- Record of weather chart entries

# Sample of Daily Journal

## DAY 1

| | Temperature | Cloud Formation | Precipitation | Wind Dir./Speed |
|---|---|---|---|---|
| newspaper | | | | |
| outside | | | | |
| internet | | | | |
| T.V. | | | | |

| | Source | Temperature | Cloud Formation | Precipitation | Wind Dir./Speed |
|---|---|---|---|---|---|
| DAY 2 | newspaper | | | | |
| DAY 3 | outside | | | | |
| DAY 4 | internet | | | | |
| DAY 5 | T.V. | | | | |

| | Source | Temperature | Cloud Formation | Precipitation | Wind Dir./Speed |
|---|---|---|---|---|---|
| DAY 6 | newspaper | | | | |
| DAY 7 | outside | | | | |
| DAY 8 | internet | | | | |
| DAY 9 | T.V. | | | | |

*It may be appropriate to allow some students to use pictures or symbols to fill in the chart.*

# *"Tides"*

## Selected Learning Activity #6

**Core Curriculum Content Standard: 5.11**

***(referred to in this document as "Science Standard 11)***

**Indicator: 5**

**Page Number: 258**

**Grade Level: 5-6**

## Category of Adaptation:

### *Instructional Presentation – Instructional Prompt*

***A* research outline *or* research guide *is intended to guide a student through a research assignment in a content area and focus a student's attention on the major ideas.***

1. Preview new terms with the students (e.g., *tidal bulge* and *azimuthal*).
2. Demonstrate how to create the paper and plastic-transparency model; prepare a procedure check-list for creating the model.
3. Provide tidal bulge/moon diagrams and Earth diagrams for students to copy or trace.
4. Model and have students color-code elements of the diagrams.
5. Provide students with a teacher-constructed research guide (see illustration).

## Category of Adaptation:

### *Classroom Organization – Instructional Groups*

- Small-group research teams with assigned roles: facilitatory, researcher(s), and recorder
- Rotate research teams through various reference materials
- Combine two groups and have them teach each other about one of the two subtopics:
  - the role of the moon in generating the ocean tides
  - an explanation of the different kinds of tides

## Category of Adaptation:

### *Classroom Organization – Instructional Support*

- Demonstrate paper and plastic-transparency model.
- Prepare a checklist for creating the paper and plastic-transparency model.
- Provide diagrams.
- Model the color-coding of the diagrams.
- Design a research guide.

## Category of Adaptation:

### *Classroom Organization – Environmental Conditions*

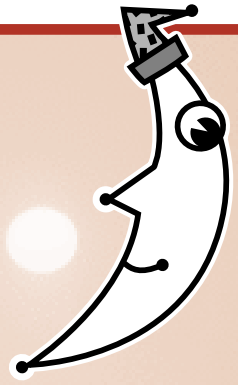
- Adequate space for creating the paper and plastic-transparency models
- Organize research stations
  - Encyclopedias
  - Reference materials on audiotape
  - Videotape
  - Internet access

## Category of Adaptation:

### *Student Response – Response Format & Procedure*

- Completed paper and plastic-transparency model
- Presentation by each group on tide subtopics
- Completed research guide and research report

# Tide Research Guide



1. What is a tide?
2. How are tides classified?
   a. Describe high tide.
   b. Describe low tide.
   c. What is slack tide?
3. Explain what causes tides.
4. Describe the range of the tides.
   a. What are spring tides?
   b. What are neap tides?
5. How can the shape of the coastline affect the behavior of the tides?
6. How do tides affect erosion?
7. Explain an undertow.

# *"Rock Properties"*

## Selected Learning Activity #7

**Core Curriculum Content Standard: 5.8**

***(referred to in this document as "Science Standard 8")***

**Indicator: 4**

**Page Number: 143**

**Grade Level: 7-8**

## Category of Adaptation:

### *Instructional Presentation – Instructional Monitoring*

***Segmenting, or dividing a task into component parts, helps the student organize information and responses into appropriate categories and follow a sequence of steps needed for task completion. Information organizers such as data charts can be used to segment information and/or responses. Similarly, physical containers can be useful in dividing specimens.***

1. Warm up students through a review of the properties of sedimentary, metamorphic, and igneous rocks.

2. Organize a "rock center" for students that includes a display of rocks and posters of rocks labeled by category.

3. Provide students with containers that have preconstructed divisions (such as egg cartons) for use in the sorting activity.

4. Have pairs of students sort rock samples by color, texture, size of grain or crystals, cleavage, hardness, etc.

5. Have student pairs sort rock samples into egg cartons labeled either *sedimentary*, *metamorphic, or igneous*. Once complete, each pair of students checks their results with the correct results in a teacher-made "answer box."

6. Prepare a data chart, segmenting information by rock sample and characteristics (see illustration). Students record rock characteristics on this data chart.

**Category of Adaptation:**

***Classroom Organization – Instructional Groups***

- Peer partners alternate roles: rock tester/experimenter and recorder

**Category of Adaptation:**

***Classroom Organization – Instructional Support***

- Provide container for dividing rocks (e.g., an egg carton).
- Develop data chart for students to record rock characteristics.
- Provide answer box to facilitate student self-monitoring of accuracy during rock-sorting activity.

**Category of Adaptation:**

***Classroom Organization – Environmental Conditions***

- Lab tables or flat workspace
- Rock-center learning station

**Category of Adaptation:**

***Student Response – Response Format & Procedures***

- Data chart used to record observations
- Sorting rocks
- Self-monitoring check against teacher-constructed answer box

**Category of Adaptation:**

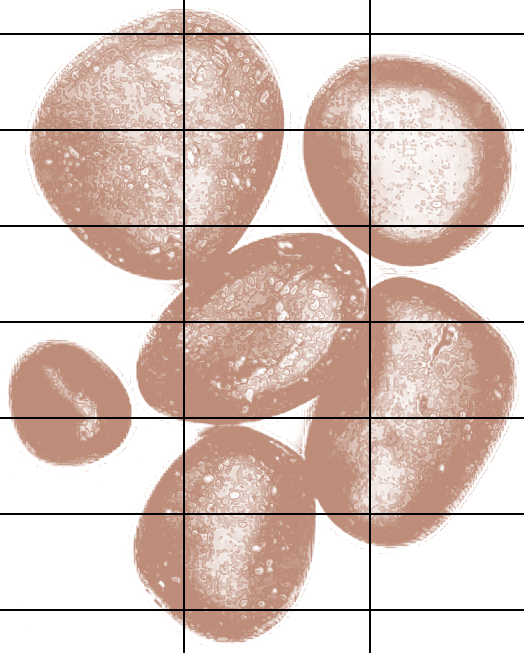
***Safety Considerations – Safety Rules & Procedures***

***Safe Use of Equipment***

- Discuss safe methods for testing hardness and cleavage.

# Rock Characteristics

| SAMPLE ROCKS | COLOR | STREAK yes/no | GRAIN large/small | TEXTURE rough/smooth | NAME OF ROCK | TYPE - IGNEOUS Sedimentary or Metamorphic |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |



# *"Energy Technology"*

## Selected Learning Activity #8

**Core Curriculum Content Standard: 5.9**

***(referred to in this document as "Science Standard 9")***

**Indicator: 13**

**Page Number: 187**

**Grade Level: 7-8**

## Category of Adaptation:

### *Instructional Presentation – Instructional Application*

**Simulation** ***activities provide students an opportunity to act out real-life experiences in a controlled situation. Students have the opportunity to take another person's role and/or experience risk taking. Simulations provide teachers an opportunity to lead a discussion concerning how the activity simulates the real world, the difficulties and insights students experience during the activity, and the relationships students discover between the simulation and the content being studied.***

1. Introduce the activity in a manner that relates the concepts of energy technology and energy conservation to the students' everyday experiences and environments.

2. Begin the lesson with a brainstorming session about energy uses. Ask questions such as the following: *How is energy used in our school? Where can we observe energy being used in our school? How is energy being conserved or wasted in our school?* Record students' responses on an overhead transparency.

3. Divide the class into small "survey" groups that will simulate an energy audit.

4. On a rotating basis, have each group simulate an energy audit of specific areas of the school building (e.g., hallways, offices, occupied and unoccupied classrooms, gymnasium, cafeteria and kitchen, auditorium). Have students record observations on a school energy survey (see "We Wondered about Wasted Watts!" illustration).

5. When groups complete their surveys, have them report and compare results.

6. Students can design awards for positive examples of energy conservation (e.g., Watts Watches).

**Category of Adaptation:**

***Classroom Organization – Instructional Groups***

- Whole-class brainstorming activity
- Small "survey" groups

**Category of Adaptation:**

***Classroom Organization – Instructional Support***

- Teacher-led brainstorming activity
- Teacher-generated school energy survey

**Category of Adaptation:**

***Classroom Organization – Adaptive Equipment***

- Overhead projector

**Category of Adaptation:**

***Student Response – Response Format & Procedure***

- Participation in a brainstorming activity
- Completion of a school energy survey form
- Participation in a discussion of survey results and comparisons

# We Wondered about Wasted Watts

## SCHOOL ENERGY SURVEY

| ROOM NUMBER | # OF LIGHTS ON | RADIO ON | FAN ON | WINDOWS OPEN/AC ON | OTHER WASTED ENERGY |
|---|---|---|---|---|---|
| | | | | | |
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# *"Investigating the Photosynthesis/Respiration Connection"*

## Selected Learning Activity #9

**Core Curriculum Content Standard: 5.6**

***(referred to in this document as "Science Standard 6")***

**Indicator: 16**

**Page Number: 107**

**Grade Level: 9-12**

## Category of Adaptation:

### *Instructional Presentation – Instructional Prompt*

***Graphic organizers** are visual representations intended to activate and direct thinking and to define the task for students. Sequence chains and Venn diagrams are two types of graphic organizers.*

- **Sequence chains** provide students with a visual display of steps or events in a process.
- **Venn diagrams** can help students generate and represent comparisons of ideas, objects, events, or people. Differences between items being compared are placed in the outer regions; similarities are recorded in the overlap area. The degree of similarity can be represented by cutting out circles or ovals and adjusting the overlap section.

1. Review the significance of oxygen and light in photosynthesis.
2. Use a Venn Diagram to introduce, reinforce, summarize, and illustrate the relationship between photosynthesis and respiration in plants and animals (see illustration).
3. Use a sequence chain to introduce, reinforce, summarize, and illustrate the oxygen and carbon cycles (see illustration).
4. Use a sequence chain to introduce, reinforce, summarize, and illustrate the connection between photosynthesis and respiration (see illustration).

**Category of Adaptation:**

***Classroom Organization – Instructional Groups***

- Cooperative learning groups with rotating roles to conduct experiment:
  - Materials preparer
  - Observer
  - Recorder
  - Illustrator

**Category of Adaptation:**

***Classroom Organization – Instructional Support***

- Teacher-created Venn diagram and sequence chains to illustrate concepts and/or monitor student understanding

**Category of Adaptation:**

***Classroom Organization – Environmental Conditions***

- Adequate lab space for student involvement

**Category of Adaptation:**

***Student Response – Response Format***

- Responses on Venn diagram
- Responses on sequence chains

**Category of Adaptation:**

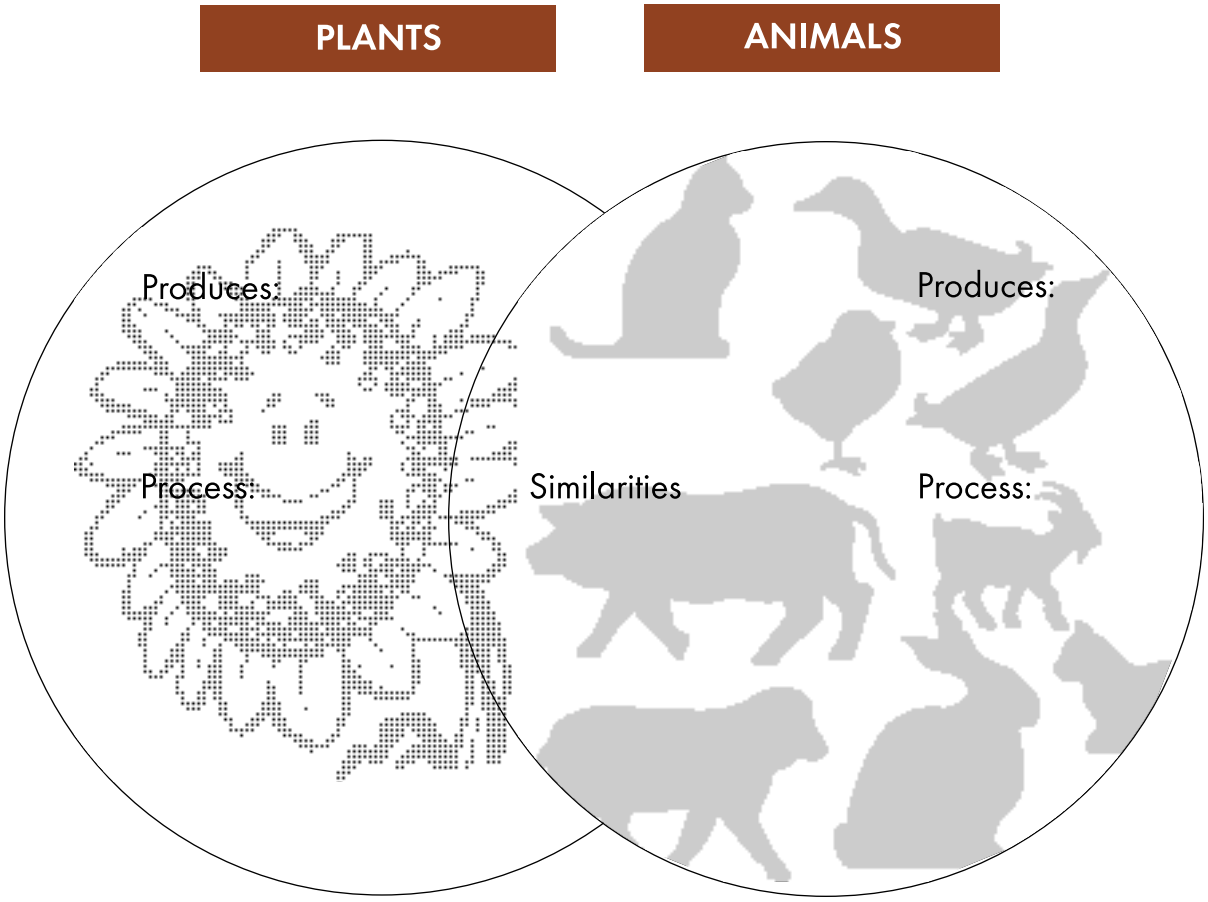
**Safety Considerations – Safety Rules & Procedures**

**Safe Use of Equipment**

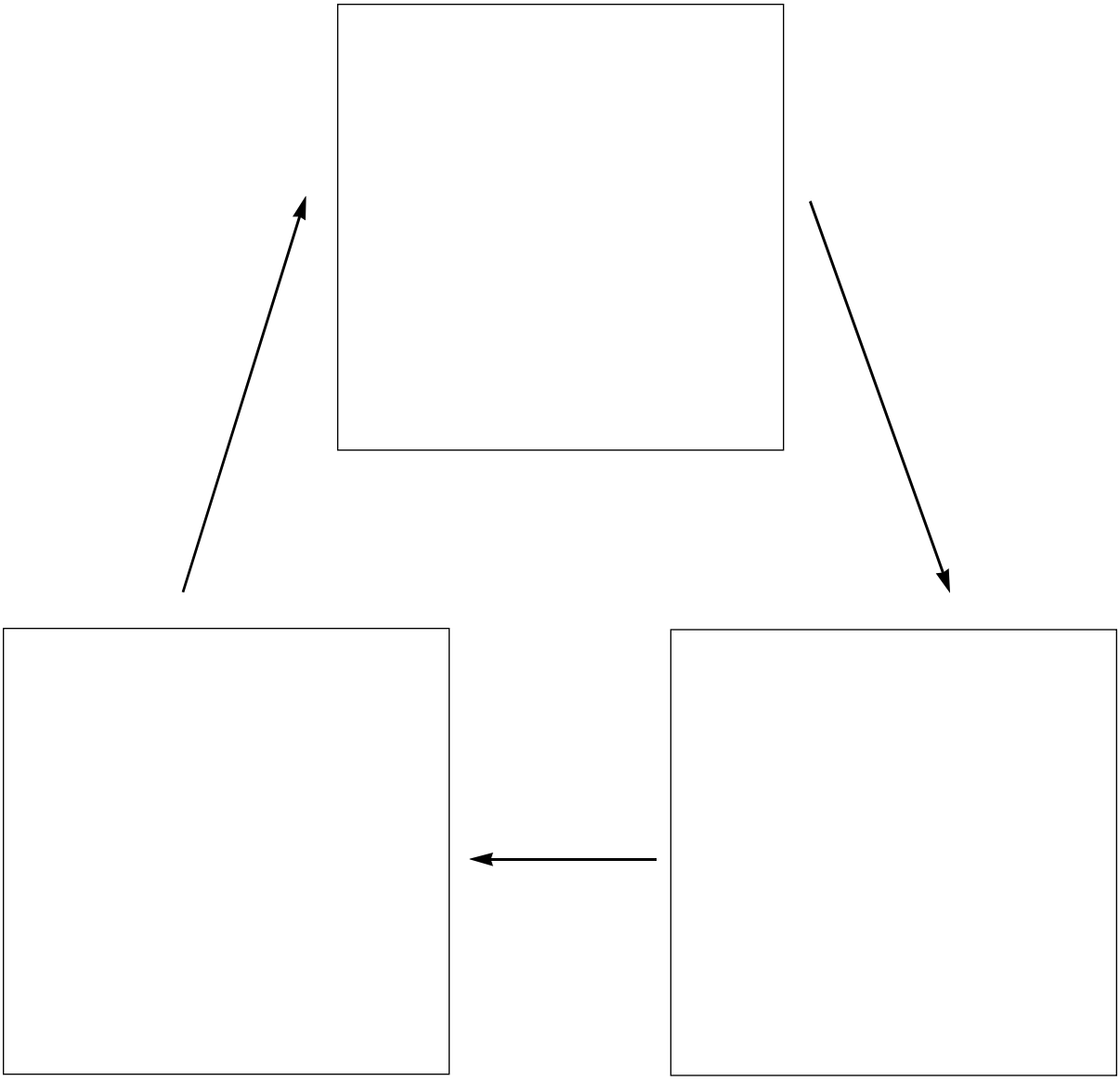
- Discuss safety rules
  - Treatment of goldfish
  - Use of bromothymol blue
- Use a nonbreakable beaker

# Venn Diagram

## Compare and Contrast
## PHOTOSYNTHESIS and RESPIRATION
## in PLANTS and ANIMALS



# A Sequence Chain: "Draw an Illustration of the Oxygen or Carbon Cycles."



# The Connection Between PHOTOSYNTHESIS and RESPIRATION

**STEP 2**

Needs: $O_2$

Produces Waste Product $CO_2$

Process: Respiration

**STEP 1**

**STEP 3**

**What product does the animal make that the plant life needs to survive?**

**$CO_2$**

**What product does the plant produce that animals need for survival?**

**$O_2$**

**STEP 4**

Needs: $CO_2$

Produces Waste Product $O_2$

Process: Photosynthesis and Respiration

## *"Cost-Benefit Analysis"*

### Selected Learning Activity #10

**Core Curriculum Content Standard: 5.11**

*(referred to in this document as "Science Standard 11")*

**Indicator: 9**

**Page Number: 269**

**Grade Level: 9-12**

**Category of Adaptation:**

***Instructional Presentation – Instructional Preparation***

**K-W-L (What I Know, What I Want to Learn, What I Learned)** *is a teaching strategy that provides a framework to elicit background knowledge, engage student interest, categorize ideas and information, and direct attention to the purpose of a lesson or activity.*

**Category of Adaptation:**

***Instructional Presentation – Instructional Application***

**Information organizers** *present information or data in a chart, graph, or pictorial form to help students draw conclusions, identify cause and effect, categorize ideas, sequence events, show relationships, and organize thoughts.*

**Category of Adaptation:**

***Instructional Presentation – Instructional Application***

**Teacher-student conferences** *provide a process by which students may benefit from sharing, thinking, and reflecting on new learnings. Conferencing interactions help teachers monitor student interests, understandings, and associations. Conferences assist students in focusing attention, constructing meaning, and developing connections.*

1. Develop background information about NASA projects and spin-off projects through a video presentation, computer search, and/or magazine review.

2. Conduct a brainstorming activity, listing NASA projects students identified through the background building activity. Organize student responses on a K-W-L chart (see illustration).

3. As students further explore NASA projects, use a teacher-generated conference sheet and conduct student conferences to monitor understanding of the relationship between NASA projects, spin-off projects, and potential project outcomes.

4. Continue completion of the K-W-L chart, brainstorming costs and benefits of NASA project.

5. Organize debate teams.

6. Guide students through the development and use of an information organizer (e.g., a discussion web) that will be used to reflect their conclusion (cost-benefit analysis) about a specific NASA project.

**Category of Adaptation:**

***Classroom Organization – Instructional Groups***

- Whole-class brainstorming activity; completion of a K-W-L chart.
- Individual teacher-student conferences
- Debate teams

**Category of Adaptation:**

***Classroom Organization – Instructional Support***

- Teacher-led brainstorming: K-W-L activity
- Teacher-created conference sheet; teacher-student conference
- Teacher-guided development of information organizer: discussion web

**Category of Adaptation:**

***Classroom Organization – Adaptive Equipment***

- Video research material
- Computer research

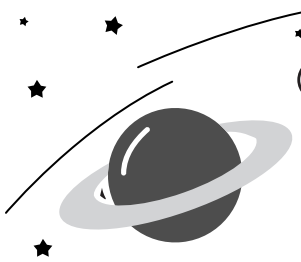
## Category of Adaptation:

### Student Response – Response Format & Procedures

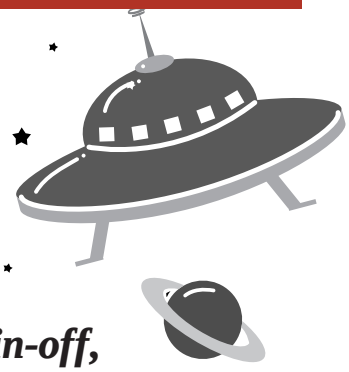
- Participation in brainstorming activities; research findings
- Teacher-student conference contributions
- Completion and discussion of information organizer (discussion web)
- Participation during debate

# K-W-L WORKSHEET FOR Space Exploration Benefits

| WHAT WE KNOW | WHAT WE WANT TO FIND OUT FROM THIS ACTIVITY | WHAT WE LEARNED AND STILL NEED TO DETERMINE |
|---|---|---|
| NASA'S LARGE SCIENCE PROJECTS | COSTS | COST-BENEFIT ANALYSIS |
| | FUNDING SOURCES | |
| | | PROS |
| SPIN OFF PROJECTS | FUNDING APPROPRIATIONS | CONS |
| | | CONCLUSIONS |
| | BENEFITS:<br>• Commercial<br>• Health<br>• Safety | |



# CONFERENCE SHEET:
## Space Spin-Off



***Directions: If listed item is a space spin-off, check Yes/No and explain why?***

| ITEM | YES | NO | WHY? |
|---|---|---|---|
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# Space Exploration Cost-Benefit Analysis
## Pros/Cons

| Pros + | Cons – |
| --- | --- |
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# *"Identifying Risks"*

## Selected Learning Activity #11

**Core Curriculum Content Standard: 5.12**

***(referred to in this document as "Science Standard 12")***

**Indicator: 9**

**Page Number: 298**

**Grade Level: 9-12**

### Category of Adaptation:

### *Instructional Presentation – Instructional Preparation*

***Brainstorming** is a group process used to activate a student's prior knowledge and build associations to a specific topic. Ideas generated are not evaluated or criticized during the brainstorming activity. Student responses are recorded in list form.*

***Webbing** is an activity frequently following the brainstorming process. During this procedure, a semantic map or web is developed based on categories derived from the "brainstorming" word list.*

### Category of Adaptation:

### *Instructional Presentation – Instructional Monitoring*

*A **timeline chart** or **time tracking sheet** is designed to provide students with a systematic means of planning, organizing, and using a schedule to complete a project such as a research assignment.*

1. Guide students through the research project by periodically conducting a brainstorming and webbing activity.

2. After students preview research materials, conduct a brainstorming session to determine what students are learning from their research efforts. List all responses generated by the students.

3. Have students identify clusters of information, such as time periods, scientific data, risk factors, and benefits.

4. Model the development of a web, translating the clusters of information into a visual representation. The web can help students organize and sequence information and develop an outline for the research report.

5. Repeat the brainstorming and webbing activity in order to monitor student progress and understanding (see illustration).

6. Provide students with a timeline chart. Assist them in developing a research and report writing schedule (see illustration).

**Category of Adaptation:**

***Classroom Organization – Instructional Groups***

- Whole group: brainstorming activity
- Small group: research teams
- Individual: research reports

**Category of Adaptation:**

***Classroom Organization – Environmental Conditions***

- Teacher-led brainstorming and webbing activity to monitor student understanding of research information and help students organize material for research report
- Teacher-designed time-tracking sheet to assist students in planning a research report and using time effectively

**Category of Adaptation:**

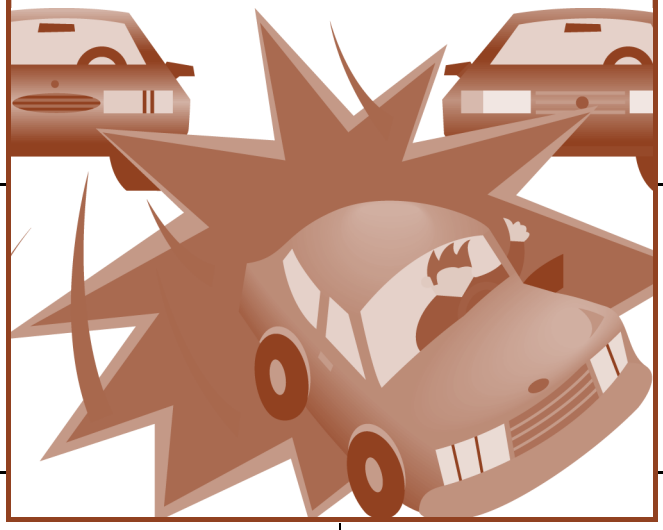
***Student Response – Response Format & Procedures***

- Research report in each student's preferred response mode (e.g., written report, oral report, illustration)

# Research Timeline

| DATE | RESEARCH ACTIVITY | |
|---|---|---|
| *9/14* | *Survey Topic - Find out what's important (e.g. dates, people, events* | ✔ |
| *9/21* | *Participate in brainstorming activity and identify key categories and issues* | |
| *9/21* | *Develop web showing major categories and issues* | |
| *9/22* | *Develop draft - outline* | |
| *9/22 - 9/30* | *Collect research information* | |
| *10/5* | *Participate in second brainstorming activity; add details to web* | |
| *10/6* | *Revise outline, if needed* | |
| *10/7 - 10/14* | *Develop first draft of research report* | |
| *10/21* | *Revise - final draft* | |

## Risks

| *Scientific Data* | | *How Injuries Were Reduced* |
|---|---|---|
| **1960 - 1970** | **Car injuries reduced by seat belts**<br>**1960 to Present**<br>  | |
| **1970 - 1980** | | |
| **1980 - 1990** | | |
| **1990 - Present** | | |

## Benefits

## REFERENCES

Carroll County Public Schools. (1994). *Hands-on elementary science: grade 4.* Longmont, CO: Sopris West.

Huck, R., Myers, R., and Wilson, J. (1989). *ADAPT: a developmental activity program for teachers.* Pittsburgh, PA: Allegheny Intermediate Unit.

Mastropieri, M.A. and Scruggs, T.E. (1993). *A practical guide for teaching science to students with special needs in inclusive settings.* Austin, TX: Pro Ed.

Pehrsson, J.E. Bean, T.W., and Baldwin, R.S. (1985). *Content area reading: an integrated approach.* Dubuque, Iowa: Kendell/Hunt Publishing Company.

Tierney, R.J., Readence, J.E., and Dishner, E.K. (1995). *Reading strategies and practices: a compendium.* Needham Heights, MA: Allyn and Bacon.

Weisgerber, R.A. (1995). *Science success for students with disabilities.* Menlo Park, CA: Addison-Wesley Publishing Company, Inc.

Wood, J.W. (1992). *Adapting instruction for mainstreamed and at-risk students.* New York: Macmillian Publishing Company.

Udvari-Solner, A. (1992). *Curricular adaptions: accommodating the instructional needs of diverse learners in the context of general education.* Topeka: Kansas State Board of Education.